



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/600,593	06/23/2003	Shmucl Winograd	YOR920030069 (00280742AA)	5507
30743	7590	12/14/2005	EXAMINER	
WHITHAM, CURTIS & CHRISTOFFERSON, P.C. 11491 SUNSET HILLS ROAD SUITE 340 RESTON, VA 20190			RIZK, SAMIR WADIE	
			ART UNIT	PAPER NUMBER
			2133	

DATE MAILED: 12/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/600,593	<b>Applicant(s)</b> WINOGRAD ET AL.	
	<b>Examiner</b> Sam Rizk	<b>Art Unit</b> 2133	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 23 June 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4-7, 11 abd 12 is/are rejected.
- 7) ☒ Claim(s) 3 and 8-10 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 June 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>6/23/2003</u> | 6) <input type="checkbox"/> Other: _____  |

***DETAILED ACTIONS***

- Claims 1-12 have been submitted for examination
- Claims 1,2,4-7,11 and 12 have been rejected
- Claims 3 and 8-10 are objected to.

***Specification Objection***

1. Page 4, line 22 should recite ".....block diagram illustrating and an encoding.....". Corrective action is required.
2. Same correction as in item no. 1 is required in page 5, line 7.

***Drawings Objection***

3. Examiner noted disconnect in figure 3, reference character (32): recite  $i > 2^n$  and the specification recite "i greater than or equal to  $2^n$ " (Note: page 9, line 14 in the specifications). corrective action is required
4. Same correction as in item no. 3 is required in figure 4, reference character (42) (Note: Page 10, line (21) in the specifications).

***Claim Rejections - 35 USC § 102***

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Murthy et al. US patent no. 6694479 (Hereinafter Murthy).

5. In regard to claim 1, Murthy teaches;

- A computer implemented encoding and correcting method comprising:
- the step of performing only exclusive OR operations on words for error correcting codes (Note: Col. 6, equations (1),(2) and Col. 7, equation (3) in Murthy) with four or more check symbols which can correct as many errors as there are check symbols.

(Note: Col. 4, lines (43-47) in Murthy)

Claim 2 is rejected under 35 U.S.C. 102(e) as being anticipated by Ghosh et al. US patent no. 6823425 (Hereinafter Ghosh)

6. In regard to claim 2, Ghosh teaches;

- A computer implemented method for encoding data and correcting erasure errors comprising the steps of:
- converting a code over a finite field of characteristic two which can correct up to e erasure errors into a code which can correct up to e erasure errors in words;
- encoding data using the converted code
- reading the encoded data and correcting up to e erasure errors in words.

(Note: Col. 9, lines(22-24) and lines (38-48) in Ghosh)

7. Claim 4 is rejected for the same reasons as claim 2.

8. In regard to claim 6, Ghosh teaches;

- A computer implemented method for encoding and correcting four or more erasure errors in data whose locations are known, comprising the steps of converting a code over a finite field of characteristic two into a code whose encoding and correcting algorithms involve only exclusive OR (XOR) operations of words;

(Note: Col. 9, lines(22-24) and lines (38-48) in Ghosh)

- reading data from main volatile memory and encoding the data using only XOR operations to generate a correcting code;

(Note: Col. 17, line 10 in Ghosh)

- storing data and correcting code in an auxiliary array of non-volatile

- storage devices,
- reading the data from the auxiliary array of non-volatile storage devices, and
- reconstructing erasure errors in the data read from the auxiliary array of non-volatile storage devices using 'only XOR operations to generate reconstructed data.

(Note: Col. 17, line 10 in Ghosh)

9. Claims 5, 7, 11 and 12 are rejected for the same reasons as claim 6.

***Allowable Subject Matter***

10. Claim 3 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an Examiner's statement of reasons for the indication of allowable subject matter:

The present invention pertains to an error correcting codes of any distance (including codes of distance greater than four) use only exclusive OR (XOR) operations. **Any code over a finite field of characteristic two are converted into a code whose encoding and correcting algorithms** involve only XORs of words (and loading and storing of the data). Thus, the implementation of the encoding and correcting algorithms is more efficient, since it uses only XORs of

words - an operation which is available on almost all microprocessors. An important code, **the (3, 3) code of distance four**.

Claim 3 recites various features:

- wherein the **converted code is a (3, 3) code**, wherein even if all the information in any three of the words  $w_i$  is erased, the data can be recovered.

The prior Art of record and, in particular Ghosh, teach a generalized method for standard Galois Field operational scheme used in advanced RAID parity calculation which can be described by matrices over the Galois Field with two elements (GF(2)).

However, the prior Art are not concerned with and do not teach the method of converting any code over a finite field of characteristic two are converted into a code whose encoding and correcting algorithms involve only XORs as taught in claim 3.

Hence the prior Art taken alone or in any combination fail to teach the claimed novel feature in claim 3 in view of its base and intervening claims.

11. Claims 8-10 are objected to for the same reasons as claim 3.

***Conclusion***

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.
- Murthy US patent no. 6643822 teaches computer system with greater than fifteen drive fault tolerance.
  - Nanda US patent no. 6792391 teaches method and system for three disk fault tolerance in a disk array.
  - English et al. US publication no. 2003/0126522 teaches correcting multiple block data loss in a storage array using a combination of a single diagonal parity group and multiple row parity groups.\
  - Byrd et al. US patent no. 6748488 teaches storage array having multiple erasure correction and sub-stripe writing.
  - Weng US patent no. 6148430 teaches encoding apparatus for RAID-6 system and tape drives.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sam Rizk whose telephone number is (571) 272-8191. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (571) 272-3819. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.



Art Unit: 2133

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronics Business Center (EBC) at 866-217-9197 (toll-free)

Sam Rizk, MSEE, ABD

Examiner

ART UNIT 2133

*[Handwritten signature]*  
12/12/05

**JOSEPH TORRES  
PRIMARY EXAMINER**

*[Large handwritten signature]*